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Title of the Invention: Disk Loading Apparatus
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Specification

Title of the Invention

Disk Loading Apparatus

What is claimed is:

1. A disk loading apparatus comprising

a disk placing plate arranged to be installed into and discharged from a housing;

a linear rack portion arranged linearly along a direction in which the disk placing plate is installed and discharged;

an arc-shaped rack portion arranged to be continuous to the linear rack portion;

a planet gear engaged with said rack portions;

a sun gear engaged with said planet gear;

a swaying arm supporting said planet gear rotatable about said sun gear;

a cam means rotating with said swaying arm; and

a disk holding means arranged to be movable up and down in conjunction with said cam means;

wherein at beginning said arc-shaped rack portion controls the installation and discharge of the disk placing plate and disk holding means, and then said arc-shaped rack portion controls only said disk holding means.

2. The disk loading apparatus as claimed in claim 1, wherein a

guiding means for guiding said swaying arm is provided along said linear rack portion and said arc-shaped rack portion.

3. The disk loading apparatus as claimed in claim 1, wherein said cam means is biased by a spring toward an upper direction.

Detailed Explanation of the Invention

[Applicable Field in Industry]

The present invention relates to a disk loading apparatus provided in a disk player.

[Summary of the Invention]

The present invention provides a disk loading apparatus, in which a control of up and down movement of a disk holding means is performed by a cam means which is rotated by the rotation of a planet gear of a sun and planet gear system, and therefore the up and down movement of the disk holding means, i.e. the chucking operation of the disk can be performed smoothly and positively in conjunction with the installation of the disk placing plate.

[Prior Art]

In a known disk loading apparatus, after placing a disk on a disk placing plate, the disk placing plate is moved into a driving portion. Then, one of the disk placing plate and driving portion is moved up or down with respect to the other of the disk placing plate and driving portion to place (chuck) the disk on the driving portion.

In the known disk loading apparatus of the kind mentioned above, the control of the disk installation and discharge operation and the up and down movement of the disk placing plate are performed by a substantially linear rack and a pinion which is engaged with a linear rack perpendicular to the substantially linear rack (Japanese Patent Application Laid-open Publication S 61-48162).

In this known disk loading apparatus, on the disk placing plate there are continuously provided a first linear rack extending in a direction in which the disk placing plate is moved and a second linear rack extending in a direction perpendicular to the first linear rack, and a pinion gear driven by a motor is provided on a stationary member to be engaged with the racks. When the pinion gear is engaged with the first linear rack, the installation and discharge operation of the disk placing plate is carried out, and when the pinion gear is engaged with the second linear rack, the driving mechanism is driven by the pinion gear which is rotated to move along the second linear rack.

[Problems to be Solved by the Invention]

In the known disk loading apparatus, the up and down movement of the disk placing plate is performed by the linear movement of the pinion gear along the second linear rack after changing the moving direction during the installation of the disk placing plate. This operation could not be performed smoothly, and thus the chucking operation of the disk could not be carried out stably.

The present invention has for its object to provide a disk loading apparatus which can perform the chucking operation of the disk smoothly and positively.

[Means for Solving the Problems]

According to the invention, a disk loading apparatus comprises a disk placing plate arranged to be installed into and discharged from a housing; a linear rack portion arranged linearly along a direction in which the disk placing plate is installed and discharged; an arc-shaped rack portion arranged to be continuous to the linear rack portion; a planet gear engaged with said rack portion; a sun gear engaged with said planet gear; a swaying arm supporting said planet gear rotatable about said sun gear; a cam means rotating with said swaying arm; and a disk holding means arranged to be movable up and down in conjunction with said cam means. According to the invention, it is preferable to provide a guiding means for guiding the swaying arm along the linear rack portion and arc-shaped rack. Furthermore, the cam means is preferably biased upward by means of a spring.

[Function]

According to the invention, in a condition that the disk placing plate is discharged from the housing, when the planet gear is rotated in a given direction via the sun gear, the rotation is transferred to the linear rack portion from the planet gear and the disk placing plate is moved into the housing. When the planet gear is engaged with the arc-shaped rack portion, the planet gear rotates and moves along the arc-shaped rack portion to rotate the swaying arm. During an initial operation, the moving speed of the disk placing plate is reduced immediately before the disk placing plate comes into the fully installed position, and after that the disk holding means is moved upward by the cam means which is rotated together with the swaying arm to chuck the disk.

During the above mentioned operation, the swaying arm is guided by the guiding means provided on the disk placing plate, and thus the engagement of the planet gear with the rack can be positively attained. Furthermore, the cam means is biased upward by means of the spring, the disk holding means is urged against the stationary member in the upper position and can be held stably.

[Embodiments]

Now an embodiment of the disk loading apparatus according to the invention will be explained with reference to the drawings.

In the drawings, a reference numeral 1 denotes generally the disk loading apparatus according to the invention and 2 represents a mechanical chassis on which mechanical components are provided. The chassis 2 is secured to a stationary member of a disk player (not shown) by means of legs 3.

4 denotes disk placing plate, 4a a circular depression on which a disk is placed and 4b depicts an opening though which an optical head and a turntable are inserted as will be explained later. The disk placing place 4 is arranged to be slidable with respect to the mechanical

chassis 2 in a back and forth direction and thus is movable into and out of the housing of the disk player. That is to say, on the upper surface of the mechanical chassis 2 there are provided journaling members 5 and 6 along one side of the chassis, and a slider rod 7 is inserted into journal openings 5a and 6a of the journaling members 5 and 6, respectively, said slider rod extending in a direction into which the disk placing plate is moved into and out of the housing. The disk placing plate 4 is secured to both end portions of the slider rod 7. In this manner, the disk placing plate 4 is supported to be movable back and forth with respect to the mechanical chassis 2.

A reference number 8 denotes a base unit on which an optical head is provided. The base unit 8 is supported such that the base unit can move up and down with respect to the opening 9 formed in the mechanical chassis 2.

The base unit 8 includes a base unit securing chassis 8a having a size slightly larger than the opening 9 and a base plate 8b supported by the chassis 8a. On the base plate 8b, there are provided various driving parts.

A slider 11 is supported movably back and forth along a guide shaft 10 provided on the base plate 8b along a side thereof, and an optical head 12 is provided on the slider 11. Between the slider 11 and the base plate 8b is arranged a linear motor 13. The linear motor 13 includes a yoke 13a secured to the base plate 8b and coil bobbins 13b secured to the slider 11. Magnets 13c are secured to the yoke 13a such that the magnets are opposed to the moving coil bobbins 13b. The optical head 12 is moved back and forth, i.e. in a direction of radius of the disk by means of the linear motor 13.

On the base plate 8b, there is further provided a spindle motor 14 such that the spindle motor situates forwardly with respect to the front end of the slider 11. A turntable 15 is secured to a driving shaft 14a of the spindle motor 14.

The base plate 8b on which the above mentioned various components are provided is supported by the base unit fitting chassis 8a by means of a fitting member 16 including coiled springs 16a serving as a buffer at four corners in a floating fashion.

On a rear end portion of the base unit fitting chassis 8a there are provided shafts 17 at both ends, and these shafts are supported by journals 18 provided on the rear surface of the mechanical chassis 2 at positions backward than the opening 9. In this manner, the base unit 8 is supported rotatably (swingably) up and down about the journal below the mechanical chassis 2.

At the free end of the base unit 8, i.e. at the front end portion of the base unit fitting chassis 8a, there is provided an engaging pin 19 to which a roller 19a is rotatably secured. The roller 19a is engaged with a cam member of the driving mechanism and the base unit 8 is moved up and down by means of the cam member.

On the base unit 2 there is further arranged a lock mechanism 20 for preventing a movement of the optical head 12 during the transportation of the disk player. To this end, an engaging depression 21 is formed at a suitable position of one side of the slider 11, and a hook type lock arm 22 is provided on the base unit fitting chassis 8a at a position corresponding to the engaging depression 21 when the base unit fitting chassis 8a is in the most forward position, said lock arm being supported by a shaft 23 rotatably in a direction perpendicular to the direction in which the slider 11 is moved.

A base portion of the lock arm 22 is extended outwardly to form an operation strip 22a whose front end is bent upwardly at right angles to form L-shaped member directing to the rear surface of the mechanical chassis 2.

On the rear surface of the mechanical chassis 2 there is secured a resilient pushing strip 24 whose front end is bent to form an L-shaped member such that the front end of the pushing strip is opposed to the lower side of the operation strip 22a of the lock arm 22. It should be noted that an escaping depression 25 is formed in the edge of the opening 9 of the mechanical chassis 2 at a position corresponding to the lock arm 22. Therefore, when the lock arm 22 is in an upright position, the lock arm is not brought into contact with the mechanical chassis 2.

When the base unit 8 is in the descend position, the front end of the pushing strip 24 of the mechanical chassis 2 is brought into contact with the lower surface of the operation strip 22a to urge resiliently the operation strip, and thus the lock arm 22 is driven into the fall down position and the front end is engaged with the engaging depression 21 of the slider 11. In this manner, the optical head 12 is locked and could not move (Fig. 6A).

When the base unit 8 is moved upward, the front end of the operation strip 22a is brought into contact with the lower surface of the mechanical chassis 2, and thus the lock arm 22 is rotated into the upright position to remove from the engaging depression 22a of the slider 11. In this manner, the lock condition of the optical head 12 is released (Fig. 6B).

It should be noted that the lock arm 22 may be biased by a spring such that the lock arm is always engaged with the engaging depression 21.

As stated above, the driving mechanism for moving the disk placing plate 4 back and forth as well as the base unit 8 up and down is provided at the front portion of the mechanical chassis 2 which supports the disk placing plate 4 movably back and forth and the base unit 8 up and down.

The driving mechanism is constructed in the following manner. A reference numeral 27 denotes a motor secured to the rear surface of the mechanical chassis 2, and a driving shaft 27a of the motor 27 protrudes from the mechanical chassis. A pulley 28 is secured to the driving shaft 27a.

A shaft 29 is provided rotatably at a position remote from the motor 27 such that the shaft extends through the mechanical chassis 2, and a swaying arm 30 is secured rotatably to a portion of the shaft 29 situating above the mechanical chassis 2 such that the swaying arm can rotate in a horizontal direction. A planetary gear mechanism 31 is provided on the swaying arm 30. The planetary gear mechanism 31 includes a sun gear 32, a planet gear 33 and a counter gear 34 provided between the sun gear 32 and the planet gear 33. The sun gear 32 is journalled to the shaft 29 and the planet gear 33 and counter gear 34 are journalled to shafts 35 and 36, respectively which are provided on the swaying arm 30.

The sun gear 32 includes a gear portion 32a and a pulley portion 32b whose diameter is larger than the gear portion 32a. The pulley portion 32b is coupled with pulley 28 of the motor 27 by means of a belt 37. The planet gear 33 includes a large diameter gear portion 33a and a smaller diameter gear portion 33b, and the smaller diameter gear portion is engaged with a rack to be explained later. The planet gear 33 further includes a cylindrical projection 33c formed at an upper center of the planet gear. The counter gear 34 includes a larger diameter gear portion 34a and a smaller diameter gear portion 34b. The larger diameter gear portion 34a is engaged with the gear portion 32a of the sun gear 32 and the smaller diameter gear portion 34b is engaged with the larger diameter gear portion 33a of the planet gear 33. Therefore, the rotating speed of the sun gear 32 is reduced by the counter gear 34 and is transmitted to the planet gear 33 which rotates in the same direction as the sun gear 32.

A projection 30a is formed at a free end of the swaying arm 30. As will be explained later, when the swaying arm 30 rotates into its end position, the projection 30a is brought into contact with a stop switch 38 provided on the mechanical chassis 2 at a suitable position, and the motor 27 is stopped.

A cylindrical cam member 39 is journalled to the shaft 29 at a position opposed to the swaying arm 30 below the mechanical chassis 2. The cam member 39 includes a cam recess 40 having a lower horizontal portion 40a, an inclined portion 40b and an upper horizontal portion 40c, these portions being formed continuously. The engaging pin 19 provided at the front end of the base unit fitting chassis 8a is engaged with the cam recess 40 via the roller 19a.

The cylindrical cam member 39 is coupled with the swaying arm 30 to rotate together with the swaying arm. That is to say, the swaying arm 30 has formed therein an engaging projection 41 which is folded to extend downward through an opening 42 formed in the mechanical chassis 2, and a front end of the engaging projection is engaged with an engaging portion 43 formed in an upper portion of the cam member 39. Therefore, the cam member 39 rotates together with the swaying arm 30.

The cam member 39 is slightly movable with respect to the shaft 29 in an axial direction, and a coiled spring 46 is provided between a recess 44 formed in the central portion of the lower end portion of the shaft 29 and a stop ring 45 secured to the lower end of the shaft 29. Due to the resilient force of the coiled spring 46, the cam member 39 is always biased upward.

On the rear surface of the disk placing plate 4 is formed a rack 47 which is engaged with the planet gear 33. The rack 47 includes a linear rack portion 48 which extends in a back and forth direction, i.e. the direction in which the disk placing plate moves with respect to the housing, and an arc-shaped rack portion 49 which is continuous to the front end of the linear rack portion 48. The arc-shaped rack portion 49 is provided on the rear surface of the disk placing plate 4 at a position nearer to the front end and the teeth of the arc-shaped rack portion 49 face inwardly. The arc-shaped rack portion 49 further includes a break zone 49a for reducing the moving speed of the disk placing plate 4 and a chucking zone 49b for performing the up and down movement. The break zone 49a and chucking zone 49b have different curvatures.

The linear rack portion 48 of the rack 47 is formed such that the smaller diameter gear 33b of the planet gear 31 is engaged with the linear rack portion at a position situating backward with respect to a center line a passing through the rotation center of the swaying arm 30 and a rotation center of the planet gear 33. The chucking zone 19b of the arm-shaped rack portion 49 is formed circularly such the smaller diameter gear portion 33b is engaged with the chucking zone at a position situating an extension of the center line a. The brake zone 49a is formed to have a deformed circle continuing the linear rack portion 48. That is to say, the brake zone 49a is formed as an arc whose curvature becomes smaller toward the linear rack portion 48.

In the rear surface of the disk placing plate 4 there is formed a guide recess 50 which extends parallelly to the rack 47, and the projection 33c of the planet gear 33 is engaged with the guide recess 50. In this manner, the swaying arm 30 is guided along the guide recess 50, and thus the engagement of the planet gear 33, i.e. the smaller diameter gear portion 33b with the rack 47 can be positively attained.

A projection 51 is provided on the rear surface of the disk placing plate 4 at a suitable position near the rear end. As will be explained later, when the disk placing plate 4 is moved into its foremost position, the projection 51 is brought into contact with a stop switch 52 provided to the mechanical chassis 2 at a suitable position and the motor 27 is stopped.

A supporting plate 53 is secured to the mechanical chassis 2 such that the supporting plate over-strides the disk placing plate 4, and a chucking unit 54 rotatably in a horizontal direction and movable up and down, said chucking unit including a magnet which opposes to the turntable 15 of the base unit 8.

Now the operation of the disk loading apparatus of the present embodiment constructed as stated above will be explained. Now it is assumed that the disk placing plate 4 is in the most forward position in which the disk placing plate is discharged from the disk player and the disk may be placed on the disk placing plate. The planet gear 33 of the planetary gear mechanism 31 is engaged with the rearmost portion of the linear rack portion 48 at a position backward the center line a. The roller 19a of the engaging pin 19 of the base unit 8 is brought into contact with the lower horizontal portion 40a of the cam recess 40 of the cam member 39, and therefore the base unit 8 is in the lower position (refer to Fig. 7A). It should be noted that when the base unit 8 is in the lower position, the optical head 12 is locked by the lock arm 22.

After placing the disk onto the circular recess 4a of the disk placing plate 4, when a loading/eject button (not shown) of the disk player is pushed, the motor 27 is driven in one direction and the sun gear 32 of the planetary gear mechanism 31 is rotated via the pulley 28 and belt 37. Then, the planet gear 33 is rotated at a reduced speed by means of the counter gear 34. The rotation of the planet gear 33 is transferred to the linear rack portion 48 of the rack 47 by means of the smaller diameter gear portion 33b and the disk placing plate 4 is moved backward into the installed position as depicted in Fig. 8A.

When the disk placing plate 4 arrives at a position immediately before the completely installed position as shown in Fig. 8B, the smaller diameter gear 33b of the planet gear 33 (hereinafter referred to planet gear) is engaged with the brake zone 49a of the arc-shaped rack portion 49. Then, the arc-shaped gear portion 49 serves as an inner teeth and the planet gear 33 moves around the sun. In this manner, the planet gear 33 rotates and moves along the arc-shaped rack portion 33, and the planet gear 33 engages with the break zone 49a of the arc-shaped rack portion 49 from the backward position with respect to the center line a toward the extended line of the center line a.

Therefore, the moving speed of the planet gear 33 relative to the arc-shaped rack portion 49 is reduced and the moving speed of the disk placing plate 4 is reduced immediately before the completely installed position. In this manner, a moderate breaking action is performed. At the same time, the swaying arm 30 is rotated in response to the movement of the planet gear 33 engaged with the arc-shaped rack portion.

After the planet gear 33 has passed through the break zone 49a of the arc-shaped rack portion 49, the planet gear 33 is engaged with the chucking zone 49b. In this condition, the disk placing plate 4 has been moved into the fully installed position, and the planet gear 33 is engaged with the chucking zone 49b of the arc-shaped rack portion 49 at a position situating on the extended line of said center line a as illustrated in Fig. 8C. The planet gear 33 is engaged with and is moved along the chucking zone 49b (moving around the sun). The swaying arm 30 is rotated about the shaft 29 together with the rotation and movement of the planet gear 33, and thus the cam member 39 is rotated integrally with the rotation of the swaying arm 30.

During the engagement and relative movement of the planet gear with respect to the rack 49, the projection 33c formed at the rotation center of the planet gear 33 is engaged with the guide recess 50 formed in parallel with the rack 47, and therefore the engagement is not released during the whole movement.

In response to the rotation of the cam member 39, the roller 19a of the engaging pin 19 of the base unit 8 is slid onto the upper horizontal portion 40c of the cam recess 40 via the inclined portion 40b. Therefore, the optical head 12, the turntable 15 and so on are extended largely above the upper surface of the mechanical chassis 2 through the opening 9, and at the same time the base unit fitting chassis 8a is urged against the lower surface of the mechanical chassis 2 (refer to Fig. 7B). During the ascending movement of the case unit 8 by means of the cam member 39, the cam member 39 is rotated by means of the swaying arm 30 only when the planet gear 33 of the planetary gear mechanism 31 is moved along the chucking zone 49b of the arc-shaped rack portion 49 while the disk placing plate 4 has been in the fully installed position. Therefore, the base unit 8 can be moved upward over a sufficient distance by means of the small cam member 39 having a short diameter.

During the upward movement of the base unit 8, immediately before the roller 19a of the engaging pin 19 of the base unit 8 has been moved from the inclined portion 40b of the cam recess 40 to the upper horizontal portion 40c, the base unit fitting chassis 8a is brought into contact with the rear surface of the mechanical chassis 2. Therefore, in the condition that the roller 19a is engaged with the upper horizontal portion 40c of the cam recess 40, the cam member 39 is moved downward against the biasing force of the coiled spring 46. Then, the base unit 8 is urged against the lower surface of the mechanical chassis 2 by the biasing force of the coiled spring 46, and thus the base unit 8 can be stably held in the upper position without generating undesired play.

In the manner explained above, the base unit 8 is moved upward and the optical head 12 and turntable 15 are inserted into the opening 4b formed in the disk placing plate 4 from the lower position. Therefore, the disk placed on the circular depression 4a formed in the disk placing plate 4 is pushed upward by the turntable 15 and is transferred onto the turntable. Then, the disk is chucked by the attraction of the disk chucking member 54 arranged opposite to the turntable 15.

In response to the upward movement of the base unit 8, the locking condition of the optical head 12 is released as explained above.

In this manner, the base unit 8 is moved upward and the planet gear 33 is rotated and moved into an end position of the arc-shaped rack portion 49, the projection 30a of the swaying arm 30 is brought into contact with the stop switch 38 and the operation of the motor 27 and the rotation of the planetary gear mechanism 31 are stopped. Then, the base unit 8 is in a fixed position with respect to the mechanical chassis 2.

In this condition, the planet gear 33 is held to be engaged with the end portion of the arc-shaped rack portion 49. Even when a force is applied from the external to pull the disk placing plate 4, the planet gear 33 could not be rotated, and therefore the disk placing plate 4 is locked in the fully installed position, and also the rotation of the cam member 39 is inhibited to hold the base unit 8 in the upper position.

When a play button of the disk player is pushed, the spindle motor 14 is energized to rotate the disk together with the turntable 15 and the optical head 12 is driven by the linear motor 13 to play the disk.

After playing the disk, the disk is discharged by pushing the loading/eject button in the following manner. That is to say, the motor 27 is driven in a direction opposite to that for performing the loading and chucking and the base unit 8 is moved downward by an operation opposite to that for chucking and the disk placing plate 4 is moved forward. When the disk placing plate 4 has been moved into the foremost position, the projection 51 is brought into contact with the stop switch 52 to stop the operation of the motor 27. In this manner, the forward movement of the disk placing plate 4 is stopped.

During an initial stage of this eject operation, the planet gear 33 of the planetary gear mechanism 31 is engaged with and is moved along the arc-shaped rack portion 49 and the disk placing plate 4 is discharged at a low speed. When the planet gear 33 is engaged with the linear rack portion 48, the discharging operation is performed at a higher speed.

In the disk player having the above mentioned disk loading apparatus of the present embodiment, the optical head 12 is locked by means of a special operation at shipping. That is to say, although the optical head 12 is moved by the linear motor 13 during the playing operation, when the linear motor 13 is not energized, the optical head 12 can move freely by means of the slider 11. Therefore, in order to prevent the optical head 12 from being hitting against the yoke of the linear motor during the transportation to avoid a damage of the optical head 12, the slider 11 is locked at shipping.

Now the locking operation of the optical head 12 will be explained. At first, the power of the disk player is switched on and then the loading/eject button is pushed to discharge the disk placing plate 4 out of the disk player. After placing the disk on the circular depression 4a of the disk placing plate 4, the loading/eject button is operated again to install the disk placing plate 4 into the disk player. As explained above, in response to this movement, the base unit 8 is moved upward to chuck the disk. After completing this chucking operation, the optical head 12 is moved into the foremost position, i.e. the innermost position of the disk by a command from a microcomputer. Then, a signal recorded on the innermost track of the disk is read out and information is displayed on a display unit of the disk player.

In this manner, after checking the disk loading operation, disk chucking operation and signal reading operation, the loading/eject button of the disk player is operated again to move the disk placing plate 4 into the pull-out position and the base unit 8 is moved downward. In response to the downward movement of the base unit 8, the lock arm 22 is engaged with the engaging depression 21 of the slider 11 situating at the foremost position to lock the optical head 12.

After removing the disk out of the disk placing plate 4 situating at the pulled-out position, the power to the disk player is switched off, and then the disk placing plate 4 is pushed manually into the fully installed position. During the manual operation of pushing the disk placing plate 4 into the fully installed position, the planet gear 33 is moved from the rearmost position of the linear rack portion 48 to the break zone 49a of the arc-shaped rack portion 49. However, the planet gear 33 could not be further moved and is not engaged with the chucking zone 49b of the arc-shaped rack portion 49, Therefore, cam member 39 is not rotated and the base unit 8 is held in the downward position. That is to say, although the disk placing plate 4 is in the fully inserted position, the base unit 8 is in the lower position and the optical 12 is locked. During the shipping, the disk player is set in this condition, and the optical head 12 can be protected from accidental damage during the transportation.

After purchasing the disk player, the power of the disk player is switched on by a user, the above explained ordinary operation is carried out and the locking condition of the optical head 12 is released by the ascending base unit 8. Therefore, it is unnecessary for the user to perform a special lock releasing operation before using the disk player.

The present invention is not limited to the embodiment explained above, but various modifications may be conceived within the scope of the invention.

For instance, the chucking zone of the arc-shaped rack portion of the rack may be formed in substantially S-shape to attain the above explained operation.

[Merits of the Invention]

As explained above, in the disk loading apparatus according to the invention, the disk placing plate is moved when the planet gear is engaged with the linear rack portion, and the traveling speed of the disk placing plate is reduced and the disk holding means is moved up and down when the planet gear is engaged with the arc-shaped rack portion. The up and down movement of the disk holding means is carried out by the rotation of the cam means due to the rotation and movement of the planet gear along the arc-shaped rack portion. Therefore, the up and down movement can be performed much more smoothly and positively as compared with the known apparatus in which the orthogonal linear movement of the gear has to be executed by changing the direction of the linear movement of the gear. In this manner, the chucking operation can be performed much more stably. Furthermore, since the disk placing plate is decelerated near the fully installed position, a mechanical shock produced by impact of the disk placing plate against the housing of the apparatus can be decreased to a large extent. Therefore, a shock noise is reduced and the disk can be effectively prevented from being injured, because the disk is hardly jumped on the disk placing plate. The operation feeling can be improved by the deceleration and acceleration of the disk placing plate.

Since the guiding means for guiding the swaying arm along the rack is provided on the disk placing plate, the engagement of the planet gear with the rack can be held positively, and even if the disk placing plate is distorted, the engagement of the planet gear with the rack is not accidentally released.

Moreover, since the cam means is biased upward by the spring, in the uppermost position, the disk supporting means is resiliently urged against the stationary portion and the disk can be played stably.

Brief Description of the Drawings

Fig. 1 is a perspective view showing a major portion of the disk loading apparatus according to the invention; Fig. 2 is a perspective view illustrating a disk placing plate with partially cut away; Fig. 3 is a perspective view depicting a chucking member; Fig. 4 is an exploded perspective view showing a planetary gear mechanism and a cam member; Fig. 5 is a front view illustrating the disk loading apparatus according to the invention with partially cut away; Figs. 6A and 6B are longitudinal cross sectional view showing operation of a locking mechanism of an optical head; Figs. 7A and 7b are side view expressing an operation of an up and down movement of a base unit; and Figs. 8A-8C are partially cut out plan views denoting an operation of the planetary gear mechanism in response to a movement of the disk placing plate.

2···mechanical chassis, 4···disk placing plate, 8···base unit serving as disk holding means, 30···swaying arm, 32···sun gear, 33···planet gear, 39···cam member, 47···rack, 48···linear rack portion, 49···arc-shaped rack portion, 50···guide recess